VACCINATION:

ITS PLACE AND POWER.

BY

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PREFACE.

A CONCISE statement of some of the facts connected with Vaccination cannot fail to be useful to Poor Law Guardians. I feel flattered, that I should have been asked to read a paper on this important subject, at a Conference of Poor Law Guardians.

It has been difficult to condense into a small compass all the facts about Vaccination. I trust I have, however, touched the more salient points, so that the reader will be able to readily understand what Vaccination is and what its merits are.

Necessarily I have availed myself of the labours of others; I have largely borrowed from the writings of Mr. John Simon, F.R.S., and the late Dr. Seaton. For some of the Statistical Tables I am indebted to Mr. Ernest Hart. I leave the interpetation of my figures to the calm judgment of my readers.

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HORTON HOUSE, HALIFAX,
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I.

Importance of vaccination, and aim of the Legislature in entrusting the enforcement of the Vaccination Acts to Boards of Guardians.

Amongst the many duties which are entrusted to Boards of Guardians, there is not a more important or responsible one than that of carrying out the provisions of the Vaccination Acts.

When the Legislature imposed this duty upon Boards of Guardians it did so in the hope that, by the existing machinery or net-work of boards spread over the country, the measure would effectually reach the poorer classes of society. The general success of the measure can only be secured by the loyal enforcement of its provisions by each local authority; for if one board enforce and another neglect the Acts, the action of the first board will be, to a certain degree, neutralized by the inaction of the other board. The intention of the Legislature is thus defeated, for the great chain of protection is broken. To be fully successful, vaccination must be general. The Vaccination Acts have thus more than a local interest.

Under compulsory powers, boards can compel parents to have their children vaccinated, or in default can institute legal proceedings which may result in fine or imprisonment. Under every aspect of the question a great responsibility rests upon Boards of Guardians, so that the subject of vaccination is well worthy of the attention of this Conference. Having such authority, it might be expected that Guardians of the poor should

know something of the history and effects of vaccination. What it is. What it claims to do. What its dangers are, and what safeguards are provided to prevent any ill results from its practice. Many objections have been raised against the measure. It is regarded unfavourably by a number of people who object conscientiously, on various grounds, against the Acts. In my opinion, it is wise to consider those objections. We do not shirk enquiry. The majority of the objections raised at the present day have been answered over and over again.

In 1868, Dr. Seaton, principal medical officer of the Local Government Board, published a volume of five hundred pages in which vaccination is exhaustively treated. It is a mine of wealth from which most modern writers on vaccination have derived inspiration. Dr. Seaton from his position was well qualified to treat the subject. He did not overlook the dangers attendant upon the operation, and he has answered the various objections which had been started up to that time.

Opposition or severe criticism is not to be deprecated. A rigid censorship can only stimulate my profession to increased carefulness in the performance of what is, at first sight, a very simple surgical operation, but which is in reality a very serious one.

I shall lay before you a mass of facts in all the coldness of detail, coloured as little as possible by my own individual feelings, in the hope of convincing you, by evidence, that the Vaccination Acts are deserving of your loyal support.

Before proceeding to the subject of vaccination, I must first explain the practice of inoculation, as many people confound the two.

Inoculation is the introduction into the skin of pure small-pox. It was found by experience that those who acquired small-pox in this artificial manner received it in a mild form. Inoculation has been practised from the most remote times. It was known to the Brahmins

of Hindostan, and to the Chinese. It was introduced into England by Lady Mary Wortley Montague, wife of the English ambassador at Constantinople, in 1717. She writes, in one of her letters, "They take the small-pox by inoculation by way of diversion in Turkey, just as they take the waters in other countries." Inoculation is dangerous to other people; it spreads small-pox. Vaccination is the introduction into the skin of a clear, bright, transparent liquid called lymph, taken from cow-pox, a species of small-pox modified by the cow's system.

The history of vaccination.

The history of vaccination is one of the most interesting in the records of medical science It commences with the life of Jenner, the discoverer, and we cannot as yet determine where the principle may end.

Jenner was born in 1749, at Berkeley, in Gloucestershire. He carried on his first experiments about 1796. He had settled in practice in Gloucestershire, a county where small-pox prevailed. During his apprenticeship a young woman came to his master's surgery and said, "I cannot take the disease for I have had cow-pox." Jenner stored the remark in his mind, thought over it, spoke about it to his medical friends, and finally put it to the crucial test of experiment.

Operation of first vaccination performed.

On the 14th May, 1796, an opportunity occurred of making the trial. Lymph was then taken from the hand of Sarah Milnes, who had been infected by her master's cows, and inserted by two superficial incisions into the arms of James Phipps, a healthy boy of about eight years old. He went through the disease apparently in a regular and satisfactory manner; but the most anxious parts of the trial still remained to be performed. It was necessary to ascertain whether he was secure from the contagion of small-pox. This point, so full of anxiety to Dr. Jenner, was fairly put to the issue on the 1st of the following July, 1797. Matter taken from a pustule of a patient suffering from small-pox, was carefully inserted by several incisions, but no disease followed. If the vaccination,

therefore, had not been protective, small-pox would have ensued. After zealously multiplying his experiments, he published his first memoir in June, 1798. Since that time, vaccination has been almost universally adopted. You can form some idea of the vast number that must have been vaccinated when I tell you that, according to the official returns of the Local Government Board, 18,744,475 persons have been vaccinated in England since 1852 to 1881, at the expense of the poor rates.

Vaccinia.

Jenner found out the natural disease vaccinia in the cow. This is somewhat difficult, as the cow is subject to other eruptions on the udder which have been mistaken for vaccinia or cow-pox. The natural disease is not however rare. In 1836, genuine vaccinia was discovered at Passy, in France, in a somewhat similar manner to that in which Jenner discovered it. A country woman had gone to Chaillot to consult Dr. Perdreaw; she was suffering from feverishness, and was otherwise indisposed. Dr. Perdreaw noticed some pustules on her hands, and on examining these he was immediately struck with their resemblance to genuine cow-pox. He questioned her. "What do you do?" She answered, "I am a milkmaid." He said, "Have you not remarked on the udder of your cow the same pustules you have shown me on yourself?" "Yes, sir—and I think I have caught them." "Have you any sores on your hand?" "Yes, sir." Some of the Passy lymph is still in use.

Discovered at Passey in 1836.

Jenner having satisfied himself that the introduction of lymph or vaccine from the cow prevented small-pox, next explained the reason why it did so. It was one of his fundamental doctrines that cow-pox was a product of the same virus which produced small-pox in man, so that a person having, accidentally or designedly, contracted cow-pox, was held by Jenner to be safe from small-pox, not because he had gone through some peculiar disease which stood in mysterious antagonism to small-pox, but simply because he had

Jenner's theory of vaccination.

gone through small-pox itself, modified, it is true, by having passed through the system of the cow. To give intentionally this mild disease, which in the animal economy was equal to an attack of true small-pox, and thus to create in it an immunity during a certain duration of this specific process, such was the idea which inspired Jenner, and from which he evolved the marvellous fact of vaccination. Jenner was only able to lay down the basis of his method, and to form hypothesis as to the extent of its application, and the duration of the acquired immunity. It was reserved for the present generation to perfect his discovery, and to eliminate sources of error.

Erroneous views of Jenner on the relation of Grease to Cow-pox.

Jenner was of opinion that cow-pox was related to the disease called "grease" in the horse. It does not at all derogate from Jenner's high position, that he was in error on this point.* We, having all the advantages afforded by modern methods of research, are able to correct the errors of our predecessors. It is now ascertained that the cow-pox disease has nothing in common with that disease familiarly called "grease."

The horse liable to a specific fever—horse-pox.

The horse is, however, liable to a specific eruption and fever, in which a pock develops which has the same property as vaccine, of protecting the human system from small-pox. Jenner was very near the truth, and the truth is that the cow-pox, horse-pox, and human small-pox are allied to one another, and have had a common origin. It would be useless to discuss as to which arose first. You all know the story of the chick and the egg. Diseases in the lower types of animals are nearer allied than we suppose to those in the higher—as man. If time allowed me I could give you many interesting illustrations derived from recent researches in modern times on this subject. There are links in creation connecting us with life in

Cow-pox, horse-pox, and small-pox have a common origin.

* Many of Jenner's views are not believed in at the present day. We live in an age of progress. We do not pin ourselves to the views of old inventors—such as Arkwright, Stevenson, Jaquard. Dr. Warlomont, of Brussels, alluding to Dr. Jenner's views, says: "Immortal though Jenner was, he was not infallible."

its lower forms. These links extend into the domain of disease.

The chief points to which I desire to direct your attention, and which I wish you to grasp, are: first, the cow is liable to a natural disease which we call vaccinia, from which vaccine, or lymph is derived. This vaccine or lymph is what is largely used at the present day, and it is derived, almost in succession, from the stock introduced by Jenner. We have the authority of the late Dr. Seaton for this, and no one was more qualified to speak on the subject. He tells us that the lymph now in use throughout the stations of the national vaccine establishments, is if not exclusively, nearly all of Jenner's original stock, and from daily opportunities of observation he can affirm that it has not lost anything of its infective power, and that the vesicles produced by it correspond accurately in their characters and course with Jenner's description.

The vaccine in use in England derived from the Jennerian stock. It is as good as ever.

Other stocks have at times been used at the establishment, but they were found to present no advantages and it was not therefore felt necessary to take any particular pains to maintain them. Second, artificial cow-pox may be produced in the cow, by means of inoculation, in various ways, (*a*) with lymph taken direct from a cow suffering from the disease in its natural, casual, or inoculated form; (*b*) with the lymph of the horse-pox, by equination; (*c*) with lymph, which derived originally from the cow or horse, has passed through the human system and become, for a longer or shorter time, humanized, by retro-vaccination. In all these forms of inoculation cow-pox is produced which will not reproduce small-pox. Though it is possible to produce cow-pox by these means there is no necessity for doing so, except by one method, viz., communicating the natural cow-pox found in the cow to calves or cows, and thus keeping up a supply of natural cultivated cow-pox. This form of animal vaccination has recently been adopted by the Local Government Board as a concession to the feelings of those who objected to the use of lymph which had

Artificial cow-pox may be produced in three ways.

already passed through the human subject; this was done to satisfy doubts, fears, imputations, and perhaps prejudices. The Local Government Board have now taken premises at 95, Lambs Conduit Street, London, where animal vaccination is carried on side by side with arm to arm vaccination. Calves are vaccinated weekly with the lymph derived primarily from a case of natural cow-pox. There can be no objection now as to the character of the lymph, and if humanized lymph is objected to, calf lymph can be obtained.

Animal vaccination adopted by Local Government Board at 95, Lambs Conduit St., London.

For the past three years I have been in the habit of vaccinating my private patients with animal vaccine. In every case it has given satisfaction, producing well marked characteristic vesicles, the only objection to it has been, it has been more expensive to my patients. I adopted animal vaccination not because I had any doubt as to the efficacy or purity of the lymph I could obtain, but as a concession to the feelings of those who object to lymph or vaccine which has passed through the human subject. I have vaccinated my own children with humanized lymph, and you may take it that I would not have introduced into the white plump arms of my own little ones anything which would be likely to harm them, or expose them to any danger of blood contamination. I have never had occasion to regret having done so. The vast majority of medical men—999 out of every 1,000—vaccinate their own children. Do you suppose that they would expose their own flesh and blood to the risk of blood poisoning, if vaccination were, as it is said to be, the introduction of impure corruptible matter? Can you for one instant imagine that we are so lost to all sense of paternal love, as to imperil the lives of our own offspring in order to bolster up a compulsory system of vaccination? If names be of any value, put in the scales of reason the action of the medical practitioners of the town who have vaccinated their own children, and the solitary example of the practitioner who refuses to do so, and weigh the evidence derived from this.

Ask yourselves the question. Assuming, and we have the right to assume it, that these practitioners have had an equal medical education, and are gifted with an equal degree of parental love, who are right, the solitary individual or the majority? It may be said that majorities are not always in the right; I have yet to learn that minorities are. The presumption here is in favour of the action of the majority.

It is a fallacy to suppose that we have anything to gain by the enforcement of the Vaccination Acts; we should make more by small-pox. Suppose that the public decided against vaccination, we would simply re-vaccinate ourselves and vaccinate our children, and thus protected, reap a rich harvest from the folly of the public. In supporting this movement we are acting, as I trust the profession will always act, for the good of mankind. The profession is acting impolitically, against its own interests, in lending its support to vaccination. Its reward is abuse—we are held up to public opprobrium. Thus it has ever been.

II.

The historical and scientific aspect of the question has now received sufficient attention, the next point to consider is the evidence—that vaccination has a protective influence against small-pox. What powers do we really claim for vaccination? Much misconception prevails on this point. *The view of Jenner was that duly and efficiently performed, it would protect the constitution from subsequent attacks of small-pox, as much as that disease itself would* He never expected it would do more, and he believed it would not do less. We know that an attack of small-pox will not be absolutely protective against a second attack. It depends on the intensity of the primary attack. What is the modern view? We must accept the opinion of Dr. Seaton on this point as expressing the views of

View of Jenner on power of vaccination.

Modern view. Opinion of Dr. Seaton.

the profession. Dr. Seaton assures us that duly and efficiently performed, the power of vaccination in influencing small-pox is almost absolute, but that it acts, not invariably by preventing, but sometimes only by controlling the disease. The vast majority of those who have gone regularly through the vaccine process, are saved thereby from any future attack, however modified or slight, of small-pox.

Protects the majority.

In the minority, who have not been rendered by it completely proof against the influence of the small-pox poison, the action of that virus on the economy is yet so modified by it that the small-pox, as a rule, is deprived of all danger to life, and does not leave behind it those disfiguring traces which are not the least of the terrors of unmodified small-pox. This is the position of the medical profession. There is no subject on which medical testimony is more unanimous than on the power of vaccination in conferring complete immunity from small-pox on the large majority successfully vaccinated. The evidence is very strong on this point. Vaccinated persons, children or grown up, have lived in crowded and ill-ventilated dwellings in which small-pox prevailed; they have occupied the same rooms and slept in the same bed with small-pox cases, mothers have nursed their babies who were suffering from the disease; and yet they themselves remained entirely unscathed.

Modifies small-pox in the minority.

The evidence.

The following instances from my own personal experience are examples of the protective power of vaccination, and the folly of neglecting it.

Instances from personal experience.

In the epidemic of 1872, a male patient was admitted from a house where all the inmates except himself had been re-vaccinated. He refused to have it done. All the family escaped. A sharp attack of confluent small-pox has converted him to a belief in vaccination.

The following is a striking case taken from the official case-book of the Halifax Borough Hospital. The patients were under my own care. In February, 1882, Thomas and George Kirkland were admitted

into the hospital with confluent small-pox of a very severe type. The father and mother and two other children had been living in the same room with the two children who were ill, and had thus been exposed to the full effect of the same small-pox poison. The two children attacked had not been vaccinated; the four other members of the family had been vaccinated. The mother, who had been nursing the two boys, almost escaped. She had what might be called an attack of small-pox which consisted of an eruption of about twenty spots. The father and the two other children completely escaped. Such facts as these are worth a ton of argument; they could be multiplied if I were to quote from the experience of others.

Circumstances which influence vaccination.

The next power we claim for vaccination is that it modifies the course of small-pox in those in whom the protection has not been absolute. Various circumstances exercise more or less of an influence on the protective power of vaccination: such as the quality of the vaccine, the age of the individual, personal, hereditary, or family susceptibility, change of climate, frequency and extent of exposure to infection, and intensity of epidemic influence. There is no rule without an exception, and the phenomena of disease, though they proceed on uniform lines, yet are liable to be disturbed by influences, over some of which we have control, but over others of which we are powerless.

Quality of the vaccination.

Amongst the circumstances which influence vaccination, the quality of the vaccination is a factor of importance. There is good and bad vaccination. The system should not only be infected, but it should be well infected. Careful observations have been made at the small-pox hospitals in London which have clearly established that according to the number of the cicatrices or marks on the arm, so has protection been afforded, so that imperfect vaccination has brought discredit upon the system.

Statistics illustrative of influence of vaccination.

Statistics are of use in enquiries of this kind. There is quite an embarrassment of riches in this respect; it

is difficult for me to select. The following figures are selected to illustrate the mortality of vaccinated and unvaccinated in small-pox epidemics.

Epidemic at Halifax in 1871-72.

In 1871 to 1872, there was an epidemic of small-pox in Halifax. The majority of the cases fell under my care at the workhouse fever hospital. The total number of cases was 115; males 62, females 53. There were five deaths. 109 of these patients had been vaccinated, of whom *three died, a ratio of three per cent.* Six were unvaccinated, of whom *two died, a ratio of 32 per cent.* So much for my own experience. The severe nature of the small-pox epidemic which visited London during the autumn of 1876, and prevailed with more or less intensity during the whole of 1877, 1878, and part of 1879, induced the managers of the Metropolitan Asylum District, upon whom, in their official capacity, devolved the treatment of a large proportion of the infected, to collect certain statistical facts which illustrate the advantages of efficient vaccination and re-vaccination as evidenced by the experiences of the medical superintendents of the several small-pox hospitals under the control of the Board. The evidence of these gentlemen confirm former opinions on the subject, and establish beyond doubt the mitigating influences in small-pox cases of successful primary vaccination, and the preventive powers of efficient re-vaccination.

London epidemic, 1876-79.

Total number attacked, 15,171.

The total number of small-pox patients treated in the various hospitals of the managers from the outbreak of the epidemic in 1876, until the commencement of the month of November, 1879, had been 15,171, of whom 11,412 were vaccinated and 3,759 unvaccinated, and it is believed that for each case treated in the Board's hospitals another was privately attended. Hence some idea may be formed of the magnitude of the epidemic. The total number of deaths which occurred in the hospitals during the period under consideration was 2,677. Of these 1,008 were vaccinated, and 1,669 were unvaccinated cases.

Mortality 17·6 per cent.

Vaccinated 8·8 per cent. Unvaccinated 44·4 per cent.

The percentage mortality upon the whole of the admissions was therefore 17·6, being at the rate of 8·8 per cent. of the vaccinated cases, and no less than 44·4 per cent. of the unvaccinated. It may be observed that among the 11,412 vaccinated patients admitted are included the majority of those who stated that they had been vaccinated, but upon whom no traces of vaccination were discernable. No case of small-pox has come within the cognizance of either of the medical superintendents of any persons who had been efficiently vaccinated and successfully re-vaccinated.

The nurses and servants employed from time to time at the various hospitals during the epidemic have enjoyed almost absolute immunity from infection; and the few—some half dozen amongst nearly one thousand—who contracted the disease whilst discharging their duties, had from some cause or another escaped re-vaccination before entering the wards. These are not my statistics, they are furnished by Mr. W. F. Jebb, Clerk to the Metropolitan Asylums (Brit. M. J., Nov. 15th, 1879). On these figures Mr. Jebb, who is not a medical man, observes: "Experience has therefore irrefutably proved that, were vaccination efficiently performed in infancy, within the period prescribed by the Vaccination Act, and re-vaccination successfully accomplished at puberty, small-pox, instead of being as it is at present a common and extremely fatal disease, would be a comparatively rare one, and so little fatal that few, if any, deaths would result from it."

Statistics furnished by Mr. Jebb.

Has vaccination lessened the general mortality from small-pox? This is worth a little attention. In the history of vaccination in the present century there are three periods to be noted. The first, ending 1840, prior to the enactment of any vaccination laws; the second, ending 1853, during which vaccination was gratuitously provided; and the third, the one in which we are now living, that may be called the era of compulsory vaccination.

Three periods to be noted in history of vaccination.

In the first period vaccination was not general, and

in the first period we had not the excellent system of death registration which we now have, though the old London bills of mortality, however, are in existence, and show us how fatal small-pox has been.

If we take certain groups of years and compare them, we shall be able to arrive at some estimate of the general effect of vaccination in lowering the mortality from small-pox.

The following calculation has been made by Dr. Seaton :—

PERIODS COMPARED.	Annual death-rate per million of the population.
1. Average of thirty years previous to introduction of vaccination, estimated by Dr. Lettsom and Sir Gilbert Blane.	3,000
2. Average of three years (1838-1840) when vaccination had become to a great extent diffused, but before any public provision was made for its gratuitous performance.	770
3. Average of nine of the years (1841-1853) when public vaccination was gratuitously provided but vaccination was not obligatory.	304
4. Average of the twelve years (1854-1865) during which vaccination has to a certain extent been obligatory.	202
5. Average of the sixteen years (1865-1881) during which vaccination has been compulsory. ...	208

Dr. Guy, Professor of Public Health at King's College, London, has put these figures in another way. He tells us that in the ten years ending 1770, natural small-pox caused 108 deaths per thousand, whilst in the ten years ending 1860, the deaths were only eleven. He adds these are remarkable figures, but they are not such as

would have satisfied the aspirations of Jenner, nor should they content us.

National statistics of other countries. Denmark, Sweden, Westphalia, Bohemia, Austria, Silesia, Germany.

If time allowed me to take a survey of the national statistics of other countries, I could lay before you evidence equally confirmatory of the protective power of vaccination. I shall give a few instances.

From the year 1762 to 1792, the number that died of small-pox in the Danish dominions amounted to 9,728. About the year 1802, vaccination was first introduced, and the practice became general but not universal; however, 58 persons only died of the small-pox to the year 1810. Mark the difference. Vaccination by command of the King was now universally adopted, and small-pox inoculation prohibited, and from the *year* 1810 *to the year* 1819, *not a single case of small-pox had occurred.*

In Sweden, where, before vaccination was discovered, the average annual death-rate from small-pox was 2,050 of every million of population, during the forty years 1810-50 it was but 158; in Westphalia, where the small-pox death-rate used to be 2,643 per million, it was from 1816-50 only 114; in Bohemia, Moravia, and Austrian Silesia, it had been reduced in like manner from 4,000 to 200; in Copenhagen, from 3,128 to 286; and in Berlin, from 3,422 to 176.

Ravages of small-pox in the natural state.

I have said enough on this part of the subject. To fully appreciate the benefits of vaccination, you should be familiar with the history of the ravages of small-pox in the natural state, before the introduction of inoculation and vaccination. Historians have left us vivid pictures of the havoc it caused in times past, and modern travellers have rendered us familiar with its horrors, in modern times, amongst uncivilized nations where the blessings of vaccination were unknown. In the natural state it is one of the most loathsome and fatal pestilences that ever affected mankind. It entailed the most distressing consequences in the shape of blindness, deafness, deformity and impaired health. It vied in its fatality with the black death, the plague, the

sweating sickness, the scurvy, and the jail distemper. It prevailed in every part of the world, amongst all races of men, in all ranks of society, in both sexes, in all seasons, and at all ages. It has swept off whole nations.*

The following instance will give you some idea of the ravages of small-pox in the uncontrolled or natural state:—Mr. Ashbury, the senior member of Parliament for Brighton, in the course of a recent yachting cruise visited the seaport town of Ceara in the Brazils. Finding that an epidemic of small-pox had recently partially depopulated the town, Mr. Ashbury inquired into the facts. He found that in one cemetery alone the burials of persons dead of small-pox amounted to 27,064 from August, 1878, to June, 1879. In December, 1878, no fewer than 14,375 persons, who had died of small-pox, were buried in this cemetery; and one day as many as 812 such persons were interred. He had not time to obtain the official returns from the other cemeteries, but he was informed, on good authority, that the burials there, during the same period, were 13,000. Thus, out of a population not exceeding 70,000 persons no fewer than 40,000 deaths from small-pox had taken place.

Opinion of Macaulay.

The great modern historian of England characterized it as the most terrible of all the ministers of death. Speaking of it in the past, Macaulay says: "The havoc of the plague had been far more rapid, but the plague had visited our shores only once or twice within living memory, but the small-pox was always present; filling the churchyards with corpses, leaving on those whose lives it spared the hideous traces of its power, turning the babe into a changeling at which the mother shuddered, and making the eyes and cheeks of the betrothed maiden objects of horror to her lover." This description applies to all countries visited by small-pox in the uncontrolled or natural state. I claim for vaccination a place as one of the most beneficent discoveries which

The place of vaccination.

* See Prescott, "Conquest of Mexico." Cook, "Voyage to Pacific." Catlin, "Lectures on Manners of North American Indians."

has ever been made for the good of humanity, and I claim for Jenner a niche, not alone in the Temple of Fame, but in the hearts of the people he has benefited. All civilized nations recognize the power of vaccination; the majority of medical men and learned societies in all countries bear testimony to its protective value. Royal commissions, not alone in England, but in other countries, have accumulated a mass of evidence, in its favour, derived from national statistics, army, navy, and hospital returns, and the testimony of the leading members of the medical profession. If you place in one scale the evidence in favour of vaccination, and in the other scale if you place the opposition of the small minority who deny its value, I think there cannot be a doubt on which side the scale will turn.

III.

The dangers of vaccination.

Vaccination is not unattended by danger. This has always been recognized by the medical profession. The medical department of the Privy Council, recognizing the importance of vaccination, have issued instructions to vaccinators which, if carried out, would entirely prevent any ill result. What are the safeguards to ensure good vaccination? First, the Guardians appoint a medical practitioner who has two qualifications, and who is acquainted with the special duties of vaccination. Secondly, the public vaccinator, when he accepts office, receives printed instructions which, in the most careful and methodical manner, lay down rules for his guidance. He must enter in a register after each vaccination full particulars of each case; numbering his cases so that he may be able to trace the source from which each vaccination was derived. He is instructed to vaccinate only those who are in good health; he is considered strictly responsible for the quality of the lymph he uses or furnishes for vaccination. He is instructed to take lymph from subjects only who are in good health, after satisfying himself

The safeguards.

Instructions of Local Government Board.

that the children are free from any taint. The instruments and lancets used for vaccinating must be kept scrupulously clean, and not be used for any other operation. In fine, the instructions are so minute and carefully drawn up, that if followed out no mishap should follow.

The National Vaccine Establishment.

At the national vaccine establishment, where lymph may be obtained, the most scrupulous care is exercised in its selection and in the processes required for its preservation. In accordance with an established practice, all lymph is subjected to a microscopical examination. Every safeguard is taken which human ingenuity could suggest. The Local Government Board have recognized from the first the great principle that, in a country where vaccination is compulsory by law, the duty of the State is to put into the hands of the public a lymph which is free from any suspicion of diathetic or constitutional adulteration. The lymph sent out from the central establishments has stood the test. It has been pure and good. Few but those who are connected with public life can appreciate the work done by the medical department of the Local Government Board in the vaccination branch alone. Work which is done out of public sight, and with little appreciation or gratitude for the labour involved in it.

18,744,475 persons vaccinated since 1852.

When we consider that over 18,000,000 persons have been vaccinated at the expense of the poor rates since 1852 to 1881, and that at least 10,000,000 have been vaccinated by private practitioners, we need not feel surprised that there should be a few cases of mishap; for no surgical operation, however slight, can be performed with perfect immunity or freedom from risk.

We expect too much from vaccination, and we also expect that the course of every vaccination will proceed without any disturbance from external or internal influences; such as the sanitary surroundings of the person vaccinated, the care and attention of those who have to look after the child, the hereditary peculiarities of the infant, and the previous taint of acquired syphilis.

Objections against vaccination.

Many extraordinary objections have been advanced against vaccination. It has been asserted that it has produced new, strange, and unheard-of diseases; that it has caused degeneration, mental and physical, of the human species, diminishing men's stature, incapacitating them for the fatigues of military service, or even for the exercise of dancing, or driving them to seek consolation in tobacco; that it stamps out parental feelings and conscience, and Christian faith and courage, and that compulsory vaccination is murderous tyranny.

Many stranger assertions have been very seriously and very vehemently made; but it is surely not necessary for me, before such an audience as this, to argue against such assertions. Many of these assertions are as unreasonable as would be the statement that the Afghan and Egyptian wars were brought about by the early vaccination of Lord Beaconsfield and Mr. Gladstone. I have answered some objections already; I have told you, first, that vaccination is not small-poxing; secondly, that Jennerian vaccination still exists; thirdly, that vaccination is not inoculation; fourthly, that vaccination mitigates small-pox and diminishes the small-pox death-rate; fifthly, that vaccination has the power of preventing small-pox in the majority of persons vaccinated; sixthly, that vaccination, wherever introduced, has lowered the small-pox death-rate, and lessened the ravages of that loathsome disease.

Some objections answered.

It may be said that my statistics are perverted. It is useless to reply to such an accusation. They are the statistics of such men as Seaton, Guy, Simon Marson—of men whose unimpeachable honour few but the most reckless would dare to assail—of men who have devoted their lives to the public service of their country, whose sole object has been to benefit their fellow-men, and who have nothing to gain by the perversion of truth.

There are a few objections which are worthy of consideration, and which I shall now attempt to answer.

Objection that vaccination increases the mortality of other diseases.

It is alleged that vaccination increases the mortality of other diseases, and though vaccination may save from small-pox, there has been no real gain of life after all, but a mere displacement of mortality; the persons who should have figured in the death register as dead of small-pox appearing at some time or other—but without living to grow old—in some other column as having died from some other disease. Vaccination does not profess to make mankind immortal; it saves from small-pox and its sequelæ, and nothing else. Everybody whom it saves therefrom lives to die from some cause, at some future period. One might as well argue on such grounds against saving a man from drowning.

Objection that cutaneous and glandular diseases may be invaccinated.

It is alleged that cutaneous and glandular diseases may be invaccinated. Inasmuch as cutaneous diseases and glandular swellings are frequently noticed in children, subsequent to their vaccination, parents are often found to allege that these diseases have been introduced by vaccination. This is a popular belief. Parents are unwilling to believe that there is anything wrong in their offspring, and when other diseases follow, vaccination gets blamed for what is really and truly due to other causes. My own experience is small, as I am not a public vaccinator, but having in my time vaccinated some thousands of my private patients, I can affirm that I have never seen any cutaneous or glandular diseases resulting from my vaccinations.

I have, in several cases, refused to vaccinate the children of fathers whom I have attended for syphilis shortly before their marriage, as I knew, that if any cutaneous eruption developed on the skin of the children, after vaccination, they would make vaccination the scape-goat for their consciences. Every medical practitioner knows that syphilis prevails in England, that young men contract it, and have to utter the words of the Psalmist, "My bones are corrupted on account of my sins," and that these young men marry before they are cured. We do not wonder that syphilitic symptoms should appear upon children, as we are in the

secret, and when such eruption does appear after vaccination we lay the blame at the proper door.

The subject of syphilitic inoculation.

I am now going to speak of the danger of transmitting syphilis by vaccination. This is a very important objection. I have said that vaccination is made the scape-goat for the sins of some parents, so that in cases of syphilitic poisoning the possible true source of this syphilis must be borne in mind before vaccination is blamed.

Pure vaccine lymph cannot communicate syphilis.

The harmlessness of vaccination, and of every medical or surgical operation, is dependent on due care being used. Pure unmixed vaccine lymph cannot communicate syphilis, even though taken from a syphilitic subject; we have well attested experiments on record to prove this. True vaccination is one thing, but the introduction of vaccine with something else added to it is another thing. If the matter of syphilis, or of any other inoculable disease, be used accidentally instead of vaccine lymph, we cannot doubt that syphilis or the disease, the material of which was used, would be the disease produced. If a lancet be used for syphilization or become in any way contaminated with the matter of syphilis, and be then used for vaccinating, there would, of course, be the same liability to communicate syphilis. Such a state of things could only arise from culpable carelessness. The practitioner who vaccinated under such conditions would be guilty of criminal mal-practice.

Foreign origin of cases of reported syphilis vaccination.

Nearly all the cases on record of syphilitic poisoning come from abroad, and when they come to be examined, they resolve themselves in instances where the vaccination has been performed by incompetent persons, and where the grossest carelessness was practiced.

Not a single case of syphilis traced to vaccination by the Local Government Board Inspectors.

During the many years in which there has been systematic inspection of public vaccination in England, millions of vaccinations have been performed, but in no single instance have the government inspectors of vaccination been able, after the most rigid enquiry, to find one single case of syphilis due to vaccination. Any person who imagines his child to have been

injured by vaccination, has the privilege, if he desires to avail himself of it, of having the facts thoroughly and impartially investigated by a government medical official. It speaks well for the carefulness of our English Public vaccinators, that Dr. Henry Stevens, Chief Vaccination Inspector of the Local Government Board, was able to state at a public conference in 1879, that in the whole of the enquiries and investigations he had made for the government, he had not been able to bring home syphilis to vaccination in any one case.

Now that animal vaccination has been introduced, and that children can be vaccinated with lymph, fresh either from the calf or cow, the objection on the ground that syphilis may be introduced is disposed of, though, as I have said, in the millions of vaccinations that have taken place in England, there has not been a single case of syphilis traced to humanized lymph.

The objection removed by animal vaccination.

The next objection is that erysipelas may follow after vaccination. This is undoubtedly true. In a small proportion of cases erysipelas has followed. When we come to examine these cases, we find that, though five or six children may be vaccinated from the same source, yet only one of the children has been attacked with erysipelas; the cause must then be looked for either in the constitution and habit of the child vaccinated, or in the surroundings of the child, as, for instance, the unhealthy atmosphere in which the child lives, the presence of erysipelas from other causes. When added to this there is mechanical irritation of the pock, friction of the clothes against the sore, we need not wonder that an inflammatory state of the arm should set in.

The danger of erysipelas.

The danger of erysipelas has always been recognized by the profession, and by the authorities who have charge of the vaccination of the country, and consequently, owing to the care taken, erysipelas has been very rare, in proportion to the vast number vaccinated.

There is a danger of erysipelas in every form of surgical operation. Erysipelas has resulted from slight

scratches, trifling wounds, drawing of a tooth ; we have to guard against it. Every fresh enquiry into cases of erysipelas after vaccination, will still further strengthen our hands by revealing to us the source of infection, thus we stand in a better position to eliminate the source of danger.

The liberty of the subject.

The last objection to which I shall allude, is one which has more than a medical bearing. Parents object to have their children vaccinated by a compulsory enactment. They say it is an interference with the liberty of the subject. Britons do not like any infringement of their liberties. The Englishman's home is supposed to be his castle, his children are his property, and he does not brook any interference with his rights over them. I am afraid this argument will not hold good in the present age. In all communities for the general good and happiness of the greater number, laws are passed which frequently press rather hardly upon individuals.

After a most painstaking enquiry, and the consideration of the evidence in favour of vaccination, and the examination of witnesses—adverse and favourable—to vaccination, the Legislature passed the Vaccination Acts. The result of their labours is to be found in the voluminous Blue Book issued at the time.

Select Committee of the House of Commons in 1871 in favour of vaccination.

In 1871, a Select Committee of the House of Commons gave a most patient hearing to those who objected to the Vaccination Act of 1867. This Committee comprised, amongst others, Mr. Foster, Mr. Jacob Bright, Dr. Lyon Playfair, Mr. Peter Taylor, Mr. Cave, Mr. W. H. Smith, Mr. Muntz, Sir Dominic Carrigan, Lord Robert Montague, Mr. Hibbert, and Dr. Brewer. The perusal of their report will show you how strong the evidence must have been, for them to have pronounced so strongly in favour of the Vaccination Acts.*

Re-vaccination.

I must now say a few words about re-vaccination ; as to why it is necessary, and when it should be per-

* See Appendix.

formed. In consequence of the large amount of imperfect vaccination, which has, until very recent years, existed, the population contains very many persons who though nominally vaccinated, and believing themselves to be protected against small-pox, are really liable to infection, and may, in some cases, contract small-pox. Partly because of the existence of this large number of imperfectly vaccinated persons, and partly because also even the best infantine vaccination sometimes, in process of time, loses more or less of its effect, it is advisable that all persons who have been vaccinated in infancy should, as they approach adult life, undergo re-vaccination. The best time of life for re-vaccination is about the time when growth is completing itself, say from fifteen to eighteen years of age. When small-pox is epidemic, all persons about fifteen years who have not been re-vaccinated should avail themselves of this measure. The evidence in favour of re-vaccination is very strong. The nurses and other servants of the London Small-pox Hospital, when they enter the service (unless it is certain that they have already had small-pox), are invariably submitted to vaccination, which, in their case, generally is re-vaccination, and is never afterwards repeated. So perfect is the protection that though the nurses live in the closest and most constant attendance on small-pox patients, and though also the other servants are, in various ways, exposed to special chances of infection, Mr. Marson, the late resident surgeon of the hospital, during his forty-one years of office there, never knew small-pox affect any one of the nurses or servants. An attempt was made to shake Mr. Marson's evidence before the Select Committee of the House of Commons in reference to one nurse, but Mr. Marson explained to the Committee that this woman came to the hospital as a patient, was some years the matron's housemaid, and was then head-nurse. The returns from the army, navy, and public services are equally strong.

The reason why it is necessary.

When it should be done.

Nurses protected absolutely by re-vaccination in small-pox hospitals.

IV.

Science a wonder-worker.

Dr. Guy has truly said that the history of vaccination is a romance of science. Though science has always been a wonder-worker, and often a dispenser of rare benefits to mankind, she never shone forth so brightly in both characters as when she put it into the mind of Edward Jenner to extract, from the neglected gossip of the dairy, the means of combating the most loathsome and fatal pestilence that ever afflicted mankind.

Jenner's discovery applied by Pasteur to the eradication of other diseases.

The principle of vaccination introduced by Jenner is receiving a new development, and it is impossible, at present, to tell where it may end. Pasteur, a great French chemist and scientific investigator, has applied the principle of vaccination to the extinction of other diseases, and he has so far succeeded in his experiments that we are likely to have, in the future, a rich result from his labours. Pasteur, in describing his experiments at the International Medical Congress, in 1881, in London, said: "That he called his system vaccination in the hope that science would accept it as an homage paid to the merit and to the immense services rendered to humanity by one of the greatest men England had ever produced—the illustrious Jenner."

In spite of our advances in medical science, and of the sanitary improvement of the country, largely brought about by the Health Act, introduced by our Chairman to-day when he was President of the Local Government Board, there are many diseases, such as scarlatina, measles, typhoid, which are still painfully rife. It will be a fortunate day for humanity when science has found out a method of combating those diseases, somewhat similar to that on which we now combat small-pox.

I do not hope to convince all of you of the value of the Vaccination Acts, that would, perhaps, be too much to expect, but I trust that the majority of this Conference will agree with me, that if vaccination were uni-

versal and effectually performed, the dangers of small-pox would be quite inconsiderable.

The careful are now subjected to danger by the careless. Whilst a number of susceptible or unvaccinated persons exist in our midst, there is danger to society, they are tinder which a spark of small-pox may inflame. We are likely to be lulled into a false security, because small-pox does not always break out, say, in a district where vaccination is imperfectly carried out. This argument is used very much by a certain class of anti-vaccinators. What is it worth? We know that though the miner has frequently descended into a mine with a naked light, yet no explosion has followed, because the exciting element, in the shape of fire-damp, did not happen to be there at the time. The miner might use this as an argument in favour of the open candle against the Davy lamp. What view does common sense and the Legislature take of it? When the miner descends into the mine with a naked light he exposes, not only his own life, but the lives of the other miners to danger and to extinction, and consequently the Legislature compels him, under a penalty, to use a safety lamp. Common sense endorses the decision of Government. In the same way the presence of persons unprotected by vaccination becomes a danger to their fellow townsmen, and as in the one case the miner is compulsorily prevented by law from exposing others to danger by using a naked light, so in the other, those who are responsible for unprotected and unvaccinated persons must be compelled, in the interests of society, to take these precautionary measures which science and experience, and common sense, have declared to be necessary and advisable. We should speak our opinion on this subject with no uncertain sound. The vital interests of the vast majority who comply with the requirements of the Vaccination Acts, should not be injured by the small band of anti-vaccinators who set the law at defiance. It is time that the passive majority should resist the active minority who are so industrious in

Danger to society from unvaccinated or susceptible persons.

The interests of the vast majority who comply with vaccination laws should not be sacrificed by the inaction of the minority.

spreading about tracts and leaflets, full of inaccuracies, against vaccination. This discussion will, I trust, do some good in this respect.

It is time that the millions whose children have been vaccinated should testify that their children have not suffered from vaccination. There are times and circumstances when to be silent is to connive.

Common-sense view of the question.

Let us look at this question in a common-sense light. What really do the risks amount to, and what proportion do they bear to the millions who have been vaccinated? The dangers are homœopathic, they are so infinitesimal.

Opinion of Dr. G. Harley, F.R.S.

Dr. George Harley, F.R.S., has well expressed the common-sense view of this question.

The principle of vaccination is strictly and soundly scientific, from the fact that it is based on the philosophic maxim, that it is always best to accept the lesser of two evils and voluntarily submit to be the victim of a mild and non-fatal form of disease, such as vaccinia, rather than run the risk of accidentally acquiring, an in all cases loathsome, and frequently fatal form of disease, small-pox.

What are the lessons which should be taught by our knowledge of the facts connected with vaccination? It seems to me conclusive that not only should the Act be enforced, but that the quality of the vaccination should be improved, so that it may become, as Jenner desired it to be, more effectual.

Vaccination should not only be enforced, but measures taken to render it more effectual.

In the early days of vaccination, vaccination was more effectual, chiefly because more attention was paid to the quality of vaccination, and to some of the conditions laid down by Jenner. Mr. Ernest Hart, who has given considerable attention to the subject of vaccination, suggests that the certificate of successful vaccination should be given, not by the public vaccinators, but by a public official, as the medical officer of health. In private practice, medical men have to defer very much to the prejudices of parents, in consequence of this any sort of vaccinal effect on the arm is regarded as a suc-

Opinion of Mr. Ernest Hart.

cessful vaccination. Dr. Seaton, whose large experience on the subject of vaccination was unequalled, also insisted very strongly on this point. He favours the proposal made by Mr. Bryce, one of the early vaccinators, that the vaccination of the country should be carried on by a special class of medical practitioners, not otherwise engaged in medical practice. In conjunction with Dr. Buchanan, the present head of the medical department of the Local Government Board, Dr. Seaton conducted an enquiry into the state of vaccinations in London, in 1863. They were struck with the great difference of results with regard to the marks on the arm. This difference was quite irrespective of general professional attainments and depended altogether on special knowledge and special practical skill; for however trifling, as a surgical operation, vaccination may be, there is nothing more certain than this: that careful observation, practical experience, and painstaking accuracy are indispensable for securing its proper results.

Opinion of Dr. Seaton.

Suggestion that public vaccination should be performed by a special class not engaged in private practice.

It was the dream and ambition of Jenner that small-pox might be completely stamped out by vaccination, and I believe that if vaccination had been truly and effectually performed, we should not have had the serious epidemics that have occurred since his time.

I trust you will take these lessons to your hearts, and that, warned by the experience of the past, you, as Guardians, will assist the Local Government Board by the loyal enforcement of the vaccination Acts, and that, recognizing the *Power* of vaccination as a protective against small-pox, you will yield to it its proper *Place*, and discourage any agitation against this wise and beneficent measure.

APPENDICES.

APPENDIX A.

Opinion of Select Committee of House of Commons on the Question.

"Eight sittings of your Committee have been occupied in hearing the evidence of persons who assert that vaccination is useless and injurious, and who, therefore, object to its enforcement and encouragement by law.

"After careful consideration of this evidence, and of medical and other evidence given in reply, your Committee *agree with the general opinion that the cow-pox affords, if not an absolute, yet a very great protection against an attack of small-pox, and an almost absolute protection against death from that disease.*

"That if the operation be performed with due regard to the health of the person vaccinated, and with proper precautions in obtaining and using vaccine lymph, there need be no apprehension that vaccination will injure health or communicate any disease.

"That small-pox, unchecked by vaccination, is one of the *most terrible and destructive of diseases*, as regards the danger of infection, the proportion of deaths amongst those attacked, and the permanent injury to the survivors; and, therefore, *that it is the duty of the State to endeavour to secure the careful vaccination of the whole population.*

"Your Committee have no doubt that the almost universal opinion of medical science and authority is in accordance with Dr. Gull, when he states that vaccination *is as protective against small-pox as small-pox itself;* with Dr. West, when he gives as the result of his experience as physician to the Children's Hospital in Great Ormond Street, and, as having had charge of between 50,000 and 60,000 children since 1835, that he does not think that vaccination does produce disease; and with Sir W. Jenner, when he says: '*I should think myself wicked, and really guilty of a crime, if I did not recommend every parent to have his child vaccinated early in life.*' Against this evidence in favour of vaccination the prevalence of the present small-pox epidemic, especially in the metropolis, has been alleged.

"Your Committee, however, believe that, on the one hand, if vaccination had not been general, this epidemic might have become a pestilence as destructive as small-pox has often been, where the population has been unprotected; and that, on the other hand, if this preventive had been universal, the epidemic could not have approached its present extent."

APPENDIX B.

Vaccination Prosecutions.

Letter from the Local Government Board to the Guardians of the Evesham Union.

Local Government Board, Whitehall, S.W.,
September 17, 1875.

Sir,—I am directed by the Local Government Board to acknowledge the receipt of your letter of the 7th instant, in which, with reference to the refusal of Mr. H—— of Broadway, to have his infant child vaccinated, you enquire whether the Guardians of the Evesham Union have, under the Vaccination Acts, any discretionary powers to abstain from taking further legal proceedings against persons who have once been fined for not complying with the law by having their children vaccinated.

The Board, in reply, direct me to state, for the information and guidance of the Guardians, their views upon the question generally in connexion with the law on the subject.

It is distinctly contemplated by Article 16 of the Board's General Order of October 31, 1874, that, independently of any proceedings which may be taken against the person in default, under section 29 of the Vaccination Act, 1867, the vaccination officer shall be authorized to take proceedings against him if he continues contumacious, at least once also under section 31 of that Act. Until, therefore, proceedings under the latter section have been taken in a case and a conviction obtained, the Board consider that the several means, which the law provides with a view to ensure the vaccination of a child, have not been used. The Board would here obseve that, from the information in their possession, it is not clear whether all the means above alluded to have been resorted to in the case of Mr. H——.

The Board at the same time direct me to point out that by Article 16 of their above-mentioned Order it is provided that in any case in which a magistrate's order has been obtained, and summary proceedings have been taken under section 31 of the Vaccination Act, 1867, no further proceeding shall be taken by the vaccination officer without the express instructions of the Guardians.

The intention of this provision is that the Guardians should carefully consider with regard to each individual case the effect which a continuance of proceedings is likely to have in procuring the vaccination of the individual child, and in insuring the observance of the law in the union generally.

The Board may further state that it is, on the one hand, undeniable that a repetition of legal proceedings has, in numerous cases, resulted

in the vaccination of a child when such vaccination has not been procured by the previous proceedings: and it is therefore important with the view of securing a proper observance of the law, that parents should be well assured that proceedings in case of non-compliance with its requirements will not be lightly discontinued. On the other hand, the Board are prepared to admit that, when in a particular case repeated prosecutions have failed in their object, it becomes necessary to carefully consider the question whether the continuance of a fruitless contest with the parent may not have a tendency to produce mischievous results, by exciting sympathy with the person prosecuted, and thus creating a more extended opposition to the law.

The Board entertain no doubt that, in all cases of the kind in question, the Guardians, having before them the preceding observations, will not fail to exercise the discretionary powers confided to them in the manner best calculated to give effect to the policy of the law.

I am, &c.

(Signed) FRAS. FLETCHER,

Assistant Secretary.

(Parliamentary Paper, No. 110 of Session 1876.)

APPENDIX C.

INSTRUCTIONS FOR VACCINATORS UNDER CONTRACT.

(*Prescribed by the Order of the Privy Council, July* 29, 1871.)

1. Except so far as any immediate danger of small-pox may require, vaccinate only subjects who are in good health. As regards infants, ascertain that there is not any febrile state, nor any irritation of the bowels, nor any unhealthy state of the skin; especially no chafing or eczema behind the ears, or in the groin, or elsewhere in folds of skin. Do not, except of necessity, vaccinate in cases where there has been recent exposure to the infection of measles or scarlatina, nor where erysipelas is prevailing in or about the place of residence.

2. In all ordinary cases of primary vaccination, if you vaccinate by separate punctures, make such punctures as will produce at least four separate good-sized vesicles, not less than half an inch from one another; or, if you vaccinate otherwise than by separate punctures, take care to produce local effects equal to those just mentioned.

3. Direct care to be taken for keeping the vesicles uninjured during their progress, and for avoiding afterwards the premature removal of the crusts.

4. Enter all cases in your Register on the day when you vaccinate them, and with all particulars required in the Register up to column 9 inclusive. Enter the results on the day of inspection. Never enter any results which have not been inspected by yourself, or your legally qualified deputy. In cases of primary vaccination, register as "successful" only those cases in which the normal vaccine vesicle has been produced; in cases of re-vaccination, register as "successful" only those cases in which either vesicles, normal or modified, or papules surrounded by areolæ, have resulted. When the vaccination of an unsuccessful case is repeated, it should be entered as a fresh case in the Register.

5. Endeavour to maintain in your district such a succession of cases as will enable you uniformly to vaccinate with liquid lymph directly from arm to arm; and do not, under ordinary circumstances, adopt any other method of vaccinating. To provide against emergencies, always have in reserve some stored lymph; either *dry*, as on thickly-charged ivory points, constantly well protected from damp; or *liquid*, according to the method of Dr. Husband, of Edinburgh, in fine, short, uniformly capillary (not bulbed) tubes, hermetically sealed at both extremities. Lymph, successfully preserved by either of these methods, may be used without definite restriction as to time; but with all stored lymph caution is necessary, lest in time it have become inert, or otherwise unfit for use. If, in order to vaccinate with recent liquid lymph, you convey it from case to case otherwise than in hermetically sealed capillary tubes, do not ever let more than eight hours intervene before it is used.

6. Consider yourself strictly responsible for the quality of whatever lymph you use or furnish for vaccination. Never either use or furnish lymph which has in it any, even the slightest, admixture of blood. In storing lymph, be careful to keep separate the charges obtained from different subjects, and to affix to each set of charges the name, or the number in your Register, of the subject from whom the lymph was derived. Keep such note of all supplies of lymph which you use or furnish, as will always enable you, in any case of complaint, to identify the origin of the lymph.

7. Never take lymph from cases of re-vaccination. Take lymph only from subjects who are in good health, and, as far as you can ascertain, of healthy parentage; preferring children whose families are known to you, and who have elder brothers or sisters of undoubted healthiness. Always carefully examine the subject as to any existing skin disease, and especially as to any signs of hereditary syphilis. Take lymph only from well-characterized, uninjured vesicles. Take it (as may be done in all regular cases on the day week after vaccination) at the stage when the vesicles are fully-formed and plump, but when there is no perceptible commencement of areolæ. Open the vesicles with scrupulous care to avoid drawing blood. Take no lymph which, as it issues from the vesicle, is not perfectly clear and transparent, or is at all thin and watery. From such a vesicle as vaccination by puncture commonly produces, do

not, under ordinary circumstances, take more lymph than will suffice for the immediate vaccination of five subjects, or for the charging of seven ivory points, or for the filling of three capillary tubes; and from larger or smaller vesicles take only in like proportion to their size. Never squeeze or drain any vesicle. Be careful never to transfer blood from the subject you vaccinate to the subject from whom you take lymph.

8. Scrupulously observe in your inspections every sign which tests the efficiency and purity of your lymph. Note any case wherein the vaccine vesicle is unduly hastened or otherwise irregular in its development, or wherein any undue local irritation arises; and if similar results ensue in other cases vaccinated with the same lymph, desist at once from employing it. Consider that your lymph ought to be changed, if your cases, at the usual time of inspection on the day week after vaccination, have not, as a rule, their vesicles entirely free from areolæ.

9. Keep in good condition the lancets or other instruments which you use for vaccinating, and do not use them for other surgical operations. When you vaccinate, have water and a napkin at your side, with which invariably to cleanse your instrument after one operation before proceeding to another.

(Signed) JOHN SIMON.

July 29, 1871.

APPENDIX D.

Number of persons vaccinated in England at the expense of the Poor Rates, from 1852 to 1881.

Years ending 29th September.	Number of Registered Births.	Number of Persons successfully Vaccinated.
1852	601,839	397,128
1853	601,223	366,593
1854	623,699	677,886
1855	623,181	448,519
1856	640,840	422,281
1857	649,963	411,288
1858	654,914	455,004
1859	669,834	445,020
1860	689,060	485,927
1861	685,646	425,739
1862	702,181	437,693
1863	720,660	646,464
1864	739,236	529,479
1865	742,680	578,583
1866	743,859	454,885
1867	766,635	490,598
1868	711,905	513,042
1869	779,039	524,143
1870	785,775	472,881
1871	792,663	693,104
1872	810,291	669,320
1873	832,255	501,189
1874	845,286	493,285
1875	853,049	498,952
1876	881,518	566,587
1877	881,897	529,376
1878	892,823	513,575
1879	884,995	519,715
1880	889,893	513,283
1881	874,474	533,005

NOTE.—Up to the year 1872, inclusive, there was no separation in the public returns of primary vaccinations and re-vaccinations. The number of persons successfully vaccinated, therefore, as given in the above Table includes the successful vaccinations performed at the expense of the Poor Rates.

APPENDIX E.

TABLE.

ANALYSIS OF 3,553 CASES TREATED AT HAMPSTEAD SMALL-POX HOSPITAL, 1871—1872.

	Admissions.		Deaths.		Death-rate per Cent.
Class I.					
1. Five marks	Males, 92 Females, 110	202	Males, 3 Females, 10	13	6·13
2. Four marks	Males, 180 Females, 154	334	Males, 18 Females, 10	28	8·38
3. Three marks.....	Males, 337 Females, 294	631	Males, 48 Females, 23	71	10·58
Two marks	Males, 616 Females, 459	1075	Males, 89 Females, 54	143	13·29
One mark.....	Males, 279 Females, 250	529	Males, 44 Females, 48	92	17·39
Class II.					
Without marks.....	Males, 361 Females, 283	644	Males, 195 Females, 162	357	55·43

VACCINATION MARKS OF PATIENTS AT HOMERTON SMALL-POX HOSPITAL, 1871—1878.

	Admissions.		Deaths.		Death-rate per 1,000.	
Class I.						
Sub-class. 1. Four marks, or more	Males, 139 / Females, 124	263	Males, 3 / Females, 1	4	15	General Death-rate of Class I. 33 per 1000.
,, 2. Three marks	Males, 226 / Females, 170	396	Males, 7 / Females, 5	12	30	
,, 3. Two marks	Males, 311 / Females, 221	532	Males, 11 / Females, 6	17	32	
,, 4. One mark	Males, 226 / Females, 209	435	Males, 11 / Females, 10	21	39	
Class II.						
Sub-class. 5. Four marks, or more	Males, 175 / Females, 196	371	Males, 9 / Females, 10	19	55	General Death-rate of Class II. 111 per 1000
,, 6. Three marks	Males, 267 / Females, 273	540	Males, 22 / Females, 20	42	77	
,, 7. Two marks	Males, 575 / Females, 377	952	Males, 71 / Females, 33	104	104	
,, 8. One mark	Males, 444 / Females, 377	821	Males, 74 / Females, 56	130	130	General Death-rate of Class III. 272 per 1000
Class III.						
Sub-class. 9.	Males, 419 / Females, 374	793	Males, 113 / Females, 103	216	272	
Class IV., unvaccinated.						General Death rate of Class IV. 452 per 1000
Sub-class 10.	Males, 834 / Females, 643	1477	Males, 394 / Females, 282	676	452	

APPENDIX G.

TABLE I.—Small-pox Mortality.

England and Wales.

Year.	Deaths from all causes.	Deaths from Small-pox.	Death-rate from Small-pox to one million living.	
1838	342,760	16,268	1,064	The annual rate of mortality in England and Wales from small-pox averaged 420 per million living in the twelve years 1838-42 and 1847-53.
1839	338.984	9,131	589	
1840	359,687	10,434	663	
1841	343,847	6,368	400	
1842	349,519	2,715	168	
1843	346,445	Causes of death in England and Wales during the four years 1843-6 have not been abstracted.		
1844	356,933			
1845	349,366			
1846	390,315			
1847	423,304	4,227	246	
1848	399,833	6,903	398	
1849	440,839	4.644	264	
1850	368.995	4,665	263	
1851	395.396	6,997	396	
1852	407.135	7,320	409	
1853	421.097	3,151	174	
	(*Compulsory Vaccination.*)			
1854	437,905	2,808	153	The annual rate of mortality from small-pox in England and Wales averaged 208·5 per million living during the twenty-six years 1854-79.
1855	425.703	2,525	136	
1856	390,506	2.277	121	
1857	419,815	3,936	206	
1858	449,656	6,460	335	
1859	440,781	3,848	197	
1860	422,721	2,749	140	
1861	435,114	1.320	66	
1862	436,566	1,628	81	
1863	473,837	5,964	293	
1864	495,531	7,684	373	
1865	490,909	6,411	309	
1866	500,689	3,029	144	
1867	471,073	2.513	118	
1868	480,622	2,052	96	
1869	494,828	1,565	72	
1870	515,329	2,620	118	
1871	514,879	23,126	1,024	
1872	492.265	19,094	833	
1873	492,520	2,364	102	
1874	526.632	2,162	92	
1875	546,453	950	40	
1876	510,315	2,401	100	
1877	500,496	4,278	175	
1878	539,574	1,856	75	
1879	528,194	548	22	

APPENDIX H.

TABLE II.—TABLE SHOWING THE ANNUAL MORTALITY FROM SMALL-POX IN ENGLAND, WITH THE PROPORTION OF DEATHS TO POPULATION AND TO TOTAL MORTALITY, FROM 1838 TO 1877 INCLUSIVE.

Year.	Population.	Deaths from all causes.	Deaths from small-pox.	Deaths from small-pox per million of population.	Deaths from small-pox per 1,000 deaths from all causes.	Place occupied by small-pox in the order of mortality of the causes of death in England.
1838	15,312,256	342,760	16,268	1,064	47·96	5th
1839	15,515,296	338,984	9,131	589	26·93	10th
1840	15,721,029	359,687	10,434	663	99·00	9th
1841	15,929,492	343,847	6,368	400	18·51	14th
1842*	16,123,793	349,519	2,715	168	7·76	25th
1847*	17,150,018	423,304	4,227	246	10·05	22nd
1848	17,356,882	399,833	6,903	398	17·32	16th
1849	17,564,656	440,839	4,644	264	10·53	20th
1850	17,773,324	368,995	4,665	263	12·90	19th
1851	17,982,849	395,396	6,997	396	18·00	15th
1852	18,193,206	407,135	7,320	409	18·28	17th
1853	18,404,368	421,097	3,151	174	7·60	26th
1854	18,616,310	437,905	2,808	153	6·49	29th
1855	18,829,000	425,703	2,525	136	6·01	34th
1856	19,042,412	390,506	2,277	121	5·90	35th
1857	19,256,516	419,815	3,936	206	9·48	24th
1858	19,471,291	449,656	6,460	335	14·54	18th
1859	19,686,701	440,781	3,848	197	8·84	26th
1860	19,902,713	422,721	2,749	140	6·59	35th
1861	20,119,314	435,114	1,320	66	3·06	46th
1862	20,371,013	436,566	1,628	81	3·77	39th
1863	20,625,855	473,837	5,964	293	12·70	21st
1864	20,883,889	495,531	7,684	373	15·64	18th
1865	21,145,151	490,909	6,411	309	13·20	21st.
1866	21,409,684	500,689	3,029	144	6·11	30th
1867	21,677,525	471,075	2,513	118	5·38	36th
1868	21,948,713	480,622	2,052	96	4·30	40th
1869	22,223,299	494,828	1,565	72	3·18	47th
1870	22,501,316	515,329	2,620	118	5·12	37th
1871	22,782,812	514,879	23,126	1,024	45·20	8th
1872	23,067,835	492,265	19,094	833	39·07	9th
1873	23,356,414	492,250	2,364	102	4·83	40th
1874	23,648,609	526,632	2,162	92	4·13	44th
1875	23,944,459	546,453	950	40	1·74	63rd
1876	24,244,010	510,315	24,08	100	4·74	39th
1877	24,547,309	500,498	4,278	175	8·57	26th

* From 1843-46, inclusive, the causes of death were not analysed by the Registrar.

APPENDIX

TABLE III.—SMALL-POX MORTALITY IN ENGLAND AND WALES AT

Year.	Estimated Population in the middle of each Year.				
	All ages.	0-5	5-10	10-20	20 and upwards
1847	17,150,018	2,256,073	2,022,318	3,537,895	9,333,732
1848	17,356,882	2,280,845	2,041,493	3,573,901	9,460,643
1849	17,564,656	2,305,650	2,060,636	3,609,899	9,588,471
1850	17,773,324	2,330,486	2,079,743	3,645,889	9,717,206
1851	17,982,849	2,355,346	2,098,808	3,681,859	9,846,836
1852	18,193,206	2,389,496	2,123,639	3,718,632	9,961,439
1853	18,404,368	2,423,903	2,148,553	3,755,401	10,076,511
1854	18,616,310	2,458,561	2,173,541	3,792,156	10,192,052
1855	18,829,000	2,493,468	2,198,603	3,828,894	10,308,035
1856	19,042,412	2,528,619	2,223,731	3,865,604	10,424,458
1857	19,256,516	2,564,011	2,248,926	3,902,280	10,541,299
1858	19,471,291	2,599,641	2,274,182	3,938,917	10,658,551
1859	19,686,701	2,635,505	2,299,493	3,975,501	10,776,202
1860	19,902,713	2,671,601	2,324,858	4,012,033	10,894,221
1861	20,119,314	2,707,920	2,350,262	4,048,491	11,012,641
1862	20,371,013	2,743,135	2,384,455	4,102,274	11,141,149
1863	20,625,855	2,778,797	2,419,133	4,156,757	11,271,168
1864	20,883,889	2,814,908	2,454,305	4,211,950	11,402,726
1865	21,145,151	2,851,480	2,489,979	4,267,862	11,535,830
1866	21,409,684	2,888,513	2,526,159	4,324,503	11,670,509
1867	21,677,525	2,926,014	2,562,855	4,381,881	11,806,775
1868	21,948,713	2,963,989	2,600,071	4,440,005	11,944,648
1869	22,223,299	3,002,443	2,637,818	4,498,887	12,084,151
1870	22,501,316	3,041,382	2,676,099	4,558,530	12,225,305
1871	22,782,812	3,080,814	2,714,932	4,618,952	12,368,114
1872	23,067,835	3,119,353	2,748,894	4,676,732	12,522,856
1873	23,356,414	3,158,372	2,783,279	4,735,230	12,679,533
1874	23,648,609	3,197,881	2,818,096	4,794,461	12,838,171
1875	23,944,459	3,237,881	2,853,347	4,854,437	12,998,794
1876	24,244,010	3,278,384	2,889,040	4,915,161	13,161,425
1877	24,547,309	3,319,394	2,925,179	4,976,642	13,326,094
1878	24,854,397	3,360,915	2,961,769	5,038,894	13,492,819

I.

VARIOUS GROUPS OF AGES IN EACH OF THE 32 YEARS 1847-78.

Deaths from small-pox in each year.					Annual death-rate from small-pox to 1,000,000 living.					Year.
All ages.	0-5	5-10	10-20	20& upwards	All ages.	0-5	5-10	10-20	20 & upwards.	
4,227	3,114	527	211	375	246	1,380	261	60	40	1847
6,903	4,782	898	470	753	398	2,097	440	132	80	1848
4,644	3,146	672	294	532	264	1,364	326	81	55	1849
4,665	3,265	629	296	485	262	1,401	298	81	50	1850
6,997	4,869	919	440	769	389	2,067	438	120	78	1851
7,420	5,076	895	470	879	402	2,124	421	126	88	1852
3,151	2,164	386	196	405	171	893	180	52	40	1853
2,808	1,659	359	219	571	151	675	165	58	56	1854
2,525	1,323	335	216	651	134	531	152	56	63	1855
2,277	1,299	272	210	496	120	514	122	54	48	1856
3,936	2,335	638	273	690	204	911	284	70	65	1857
6,460	3,585	1,113	529	1,233	332	1,379	489	134	116	1858
3,848	2,247	478	359	764	195	853	208	90	71	1859
2,749	1,544	307	260	638	138	578	132	65	59	1860
1,320	723	140	132	325	66	267	60	33	30	1861
1,628	931	173	141	383	80	339	73	34	34	1862
5,964	3,267	622	520	1,555	289	1,176	257	125	138	1863
7,684	4,294	800	640	1,950	368	1,525	326	152	171	1864
6,411	3,262	647	598	1,904	303	1,144	260	140	165	1865
3,029	1,662	297	261	809	141	575	118	60	69	1866
2,513	1,370	211	211	721	116	468	82	48	61	1867
2,052	1,234	204	162	452	93	416	78	36	38	1868
1,565	892	191	116	366	70	297	72	26	30	1869
2,620	1,245	371	247	757	116	409	139	54	62	1870
23,126	7,770	3,440	3,013	8,903	1,015	2,522	1,267	652	720	1871
19,094	5,758	3,126	2,810	7,400	828	1,846	1,137	601	591	1872
2,364	587	322	354	1,101	101	186	116	75	87	1873
2,162	543	231	388	1,000	91	170	82	81	78	1874
950	271	96	158	425	40	84	34	33	33	1875
2,408	612	261	351	1,184	99	187	90	71	90	1876
4,278	1,056	478	659	2,085	174	318	163	132	156	1877
1,856	472	218	336	830	75	140	74	67	62	1878

APPENDIX J.

TABLE IV.—TABLE SHOWING THE CASES AND DEATHS FROM SMALL-POX AMONGST THE BRITISH TROOPS SERVING IN THE UNITED KINGDOM FOR EIGHTEEN YEARS (1859-76).

Year.	Number of Troops.	Cases of Small-pox.	Deaths.	Ratio per 10,000 of strength.	
				Cases.	Deaths.
1859	71,715	175	7	24·4	0·97
1860	85,443	140	9	16·4	1·05
1861	88,955	51	4	5·7	0·45
1862	78,173	64	4	8·1	0·51
1863	75,945	123	6	16·2	0·79
1864	73,252	111	10	15·1	1·36
1865	72,999	84	6	11·5	0·80
1866	70,292	38	1	5·4	0·15
1867	63,904	31	1	4·8	0·16
1868	78,261	65	2	8·3	0·26
1869	73,764	9	0	1·2	0·00
1870	75,305	24	1	3·2	0·13
1871	92,667	213	24	23·0	2·59
1872	92,218	131	18	14·2	1·95
1873	88,957	10	1	1·1	0·11
1874	86,837	7	*	0·8	0·05*
1875	73,279	5	*	0·7	0·05*
1876	87,758	25	*	2·8	0·20*

* It is greatly to be regretted that the numbers of Small-pox deaths, if any, for 1874, 1875 and 1876, and of cases and deaths for 1877, have not been published in the Blue Books of the Army Medical Department. The ratios of deaths in the last column are therefore estimated ratios only, based on the average proportion of cases to deaths for the previous fifteen years. For some years past the Army Medical Department have given only the statistics of *Classes* of Disease, as "Eruptive Fevers," for example. Statistics of particular diseases, as small-pox have ceased to be published, and the value of the reports for scientific purposes is immensely lessened in consequence. Attention has repeatedly been called to this matter in periodicals and reviews, but it is stated that the War Office objected to the expense entailed by printing the details of special diseases. If this be correct, I can only say that it appears to me a most lamentable piece of economy in an entirely wrong direction.

APPENDIX K.

TABLE V.—TABLE SHOWING THE CASES AND DEATHS FROM SMALL-POX IN THE BRITISH NAVY EMPLOYED ON THE HOME FORCE FOR TWENTY YEARS (1859-78).

Year.	Mean strength.	Cases of Small-pox.	Deaths.	Ratio per 10,000 of strength.	
				Cases.	Deaths.
1859	19,300	51	4	26·4	2·07
1860	23,500	84	12	35·7	5·10
1861	22,900	35	1	15·3	0·43
1862	20,760	8	1	3·8	0·48
1863	21,570	39	2	18·0	0·92
1864	19,630	199*	9*	101·3	4·58
1865	20,980	18	0	8·6	0·00
1866	21,200	29	0	13·7	0·00
1867	21,600	30	0	13·9	0·00
1868	23,200	16	0	6·9	0·00
1869	22,100	8	0	3·6	0·00
1870	21,000	24	0	11·4	0·00
1871	22,100	67	4	30·3	1·81
1872	23,000	62	9	26·9	3·91
1873	22,400	7	0	3·1	0·00
1874	22,500	2	0	0·9	0·00
1875	21,600	1	0	0·4	0·00
1876	20,800	0	0	0·0	0.00
1877	21,000	2	0	0·9	0·00
1878	19,000	4	0	2·1	0·00

* This remarkable return, being so greatly heavier than any other year, needs a word of explanation. No fewer than three-quarters of the cases (151), and two-thirds of the deaths (6) were from infection at Portsmouth, where the very large number of 228 deaths from small-pox occurred in 1864. Nor was this all. From infection traced to Portsmouth the disease manifested itself on board the *Duncan*, when on its voyage for the North American station; 38 men were temporarily disabled by it, and 1 died.